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JUN 15 1978

PHSB STUDIES

A Special Report Series by the N.C. Department of Human Resources, Division of Health Services, Public Health Statistics Branch, P.O. Box 2091, Raleigh, N.C.

No. 2

February 1977

RELATIONSHIPS BETWEEN MARITAL STATUS AND MORTALITY IN NORTH CAROLINA

As cancer mortality continues to spiral in the United States, research into the epidemiology and etiology of the disease becomes increasingly more fervent and widespread. Thus, a number of studies have come to identify some important correlates of various forms of cancer, among these, the demographic correlates of age, race, sex, geography and marital status (1).

In North Carolina, previous studies and reports (2,3) have examined cause-specific mortality by age, race, sex and geographical distribution, but no attempt has been made to examine mortality in terms of marital status. The present study does this, not only for major cancer sites but for other leading causes of death as well. A search of recent literature (4) failed to reveal current research in this area, except with respect to cancer.

In the sections to follow, age-adjusted and age-specific death rates and a statistical test known as the chi-square criterion are used to describe the State's mortality experience for the period 1973-1975, specific for population subgroups 15 and older. A preceding publication (3) describes the cause of death categories in terms of codes from the International Classification of Diseases, Adapted; other definitions used in these analyses are given on pages 6 and 7.

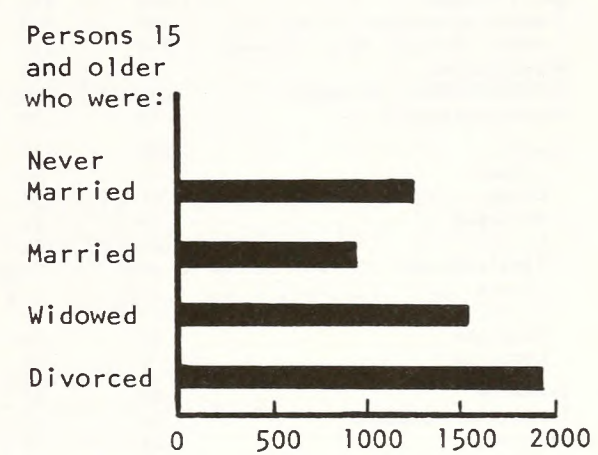
Age-adjusted Death Rates

The age-adjusted rates of Table 1 show that, for all race-sex groups, married North Carolinians aged 15 and older experienced lower mortality than never married, widowed and divorced persons. Divorced persons experienced the highest mortality except for nonwhite females among whom divorcées experienced lower mortality than never marrieds and widows.

As a whole, relationships between marital status and mortality were generally not as strong for nonwhite females as for the other race-sex groups; Table 1 also shows very small mortality differentials between married and never married white males and between widowed and divorced white males, particularly with respect to the cardiovascular diseases.

On a cause-specific basis, patterns in marital mortality varied; however, as indicated by the chi-square results summarized in Table 2, all race-sex groups

ADJUSTED DEATH RATES, 1973-1975



Deaths per 100,000 Population
(adjusted for age, race and sex)

TABLE 1
Age-adjusted Death Rates*
North Carolina, 1973-1975

	White Males				White Females			
	Never Married	Married	Widowed	Divorced	Never Married	Married	Widowed	Divorced
All Causes	1,633	1,346	2,188	2,618	763	580	846	1,325
Heart Disease	594	577	836	859	251	206	311	500
Acute Myocardial Infarction	334	347	475	478	111	103	146	199
Other Ischemic Heart Disease	189	187	293	296	114	83	135	273
Hypertension	3	4	6	8	3	2	3	4
Cerebrovascular Diseases	135	138	190	178	101	86	122	199
Arteriosclerosis	14	16	27	24	13	9	15	16
Cancer	213	238	286	347	111	103	125	182
Stomach	10	8	9	9	4	3	4	5
Colon	20	23	26	21	17	17	19	26
Pancreas	11	14	19	27	7	7	7	19
Lung	66	77	95	149	12	11	16	20
Female Breast	-	-	-	-	34	25	30	32
Cervix	-	-	-	-	3	5	9	12
Ovary	-	-	-	-	13	10	9	7
Prostate	16	27	30	12	-	-	-	-
Leukemia	6	11	6	11	4	6	5	10
Diabetes	23	19	28	29	16	14	21	22
Influenza/Pneumonia	75	37	57	102	38	13	24	53
Emphysema	30	27	58	60	7	5	7	10
Cirrhosis of the Liver	34	18	53	139	7	10	18	20
Nephritis/Nephrosis	9	4	9	12	4	3	2	3
Motor Vehicle Accidents	70	42	156	147	15	15	27	71
Other Accidents	89	40	77	188	24	12	23	35
Suicide	44	28	106	91	10	10	13	23
Homicide	23	15	36	81	3	5	9	15
All Other Causes	272	142	261	353	127	65	94	140

	Nonwhite Males				Nonwhite Females			
	Never Married	Married	Widowed	Divorced	Never Married	Married	Widowed	Divorced
All Causes	2,424	1,595	2,545	3,199	1,163	784	1,344	987
Heart Disease	660	534	800	952	385	255	466	311
Acute Myocardial Infarction	296	248	340	475	142	98	175	122
Other Ischemic Heart Disease	266	221	377	346	182	119	230	148
Hypertension	19	16	23	34	11	8	12	21
Cerebrovascular Diseases	247	208	358	407	185	128	221	111
Arteriosclerosis	23	19	26	5	19	9	20	9
Cancer	348	278	362	466	147	115	168	130
Stomach	22	20	22	28	13	4	10	5
Colon	21	24	17	64	21	19	28	11
Pancreas	9	15	28	32	7	8	12	6
Lung	109	76	95	145	6	8	12	9
Female Breast	-	-	-	-	36	26	39	37
Cervix	-	-	-	-	19	17	32	16
Ovary	-	-	-	-	8	7	7	10
Prostate	33	58	65	30	-	-	-	-
Leukemia	4	10	13	14	0	4	4	2
Diabetes	52	32	39	45	46	35	55	64
Influenza/Pneumonia	91	47	97	113	22	22	35	32
Emphysema	18	11	25	20	8	2	5	9
Cirrhosis of the Liver	72	24	53	127	34	17	46	44
Nephritis/Nephrosis	31	15	20	23	14	9	16	9
Motor Vehicle Accidents	123	71	83	138	18	16	28	32
Other Accidents	178	67	121	211	35	18	30	27
Suicide	15	11	55	40	2	2	3	0
Homicide	126	78	107	198	22	22	28	21
All Other Causes	419	181	375	420	180	102	170	130

*Deaths per 100,000 population.

experienced statistically significant differences in age-adjusted marital mortality for a number of causes including total heart disease and its two major components—acute myocardial infarction and other ischemic heart disease—as well as cerebrovascular disease, total cancer, cirrhosis of the liver, and non-motor-vehicle accidents.

TABLE 2
Summary of Significant Chi-Square Values
(Tests of Differences in Marital Mortality*)

Cause/Race-sex	Probability (p) of a larger value															
	p < .001				p < .01				p < .05				p < .10			
	WM	WF	NWM	NWF	WM	WF	NWM	NWF	WM	WF	NWM	NWF	WM	WF	NWM	NWF
All Causes	x	x	x	x												
Heart Disease	x	x	x	x												
Acute Myocardial Infarction	x	x	x	x												
Other Ischemic Heart Disease	x	x	x	x												
Hypertension																
Cerebrovascular Diseases		x	x	x	x											
Arteriosclerosis										x		x				
Cancer	x	x	x					x								
Stomach												x				
Colon															x	
Pancreas										x			x		x	
Lung	x		x													
Breast														x		
Cervix						x										
Ovary																
Prostate	x										x					
Leukemia													x			
Diabetes											x			x		x
Influenza/Pneumonia	x	x	x													
Emphysema	x															x
Cirrhosis of the Liver	x	x	x	x												
Nephritis/Nephrosis	x										x					
Motor Vehicle Accidents	x	x	x													
Other Accidents	x	x	x									x				
Suicide	x		x							x						
Homicide	x	x	x													
All Other Causes	x	x	x	x												

*See page 6 for explanation of the observations used in these analyses.

In addition to comparing marital mortality within race-sex groups, the age-adjusted rates of Table 1 allow for comparisons across race-sex-marital groups, and some interesting results accrue. Considered against the general patterns of higher mortality among males and nonwhites and among the divorced and widowed, the following observations seem notable:

- Acute myocardial infarction rates were generally higher for white males than for nonwhite males; divorced and widowed white males and divorced nonwhite males experienced comparably high rates.
- Other ischemic heart disease mortality was generally higher for nonwhites except that divorced white females experienced the highest of the female rates.

- Cerebrovascular disease mortality was higher for nonwhites, but the rate for divorced white females was particularly excessive.
- Divorced nonwhite males experienced the lowest arteriosclerosis rate; married females also experienced low rates.
- Stomach cancer mortality was generally higher among males and nonwhites; among nonwhite females, never marrieds and widows experienced high rates.
- Divorced nonwhite males experienced high colon cancer mortality.
- Divorced white women and widowed and divorced men of both races experienced high pancreatic cancer rates.
- Divorced white and nonwhite males experienced about the same high levels of lung cancer mortality, and widowers of both races also experienced high rates. Nonwhite females generally experienced low lung cancer rates.
- White and nonwhite females experienced about the same levels of breast cancer mortality; married women experienced the lowest rates.
- Nonwhite females generally experienced higher levels of cervical cancer mortality with nonwhite widows experiencing the highest rate.
- Marital status differentials in ovarian cancer were not observed.
- Prostatic cancer rates were twice as high for nonwhites as for whites, but widowed and married men of both races experienced excessive mortality.
- Leukemia mortality was greater for males than for females; never married persons experienced the lower rates.
- Nonwhites experienced excessive diabetes mortality; married persons experienced the lower rates.
- Emphysema rates were consistently highest for white males with widowed and divorced white men experiencing the highest rates. Married nonwhite females experienced low emphysema mortality.
- Divorced males experienced excessive cirrhosis mortality with divorced white and nonwhite men experiencing comparably high rates. Divorced and widowed women also experienced excessive cirrhosis mortality; rates were higher for nonwhite women than for white women.
- Rates for the related diseases, hypertension and nephritis, were predictably higher for nonwhites; married men experienced low nephritis rates.
- Widowed and divorced white males and divorced and never married nonwhite males experienced comparably high motor vehicle mortality; divorced women also experienced high rates.
- Suicide rates were far higher for whites than for nonwhites; widowed and divorced males and divorced white females experienced excessive rates.
- Homicide rates were far higher for nonwhites than for whites; except among nonwhite females, divorced persons were most apt to be victims.

TABLE 3
Age-specific Death Rates* by Race,
Sex and Marital Status
North Carolina, 1973-1975
TOTAL DEATHS

Age	White Males				White Females			
	Never Married	Married	Widowed	Divorced	Never Married	Married	Widowed	Divorced
15-19	173	142	296	167	62	72	57	268
20-24	196	130	442	255	68	46	44	224
25-29	339	137	270	614	134	48	133	137
30-34	490	157	380	838	197	75	110	259
35-39	702	227	1,057	902	286	121	290	267
40-44	835	369	458	1,986	376	186	262	557
45-49	1,399	666	894	3,302	604	301	490	604
50-54	2,332	1,087	1,936	3,228	576	470	701	934
55-59	2,552	1,641	4,299	4,938	1,011	640	967	1,299
60-64	5,013	2,663	6,409	6,328	1,051	980	1,341	1,266
65-69	4,632	3,980	4,785	6,738	1,623	1,551	1,846	2,417
70-74	6,999	5,686	6,962	10,023	2,925	2,606	3,036	2,516
75-79	5,049	7,815	11,501	13,001	3,944	4,534	5,156	3,263
80-84	7,092	12,093	16,441	8,704	7,506	5,580	9,181	36,797
85+	5,920	20,039	21,311	6,771	12,421	6,601	15,636	19,835

Age	Nonwhite Males				Nonwhite Females			
	Never Married	Married	Widowed	Divorced	Never Married	Married	Widowed	Divorced
15-19	190	121	0	0	62	59	0	0
20-24	370	243	214	806	130	98	54	165
25-29	823	349	751	1,009	252	123	139	172
30-34	989	421	625	1,717	353	212	503	215
35-39	1,971	608	1,499	1,187	642	284	763	381
40-44	2,306	885	2,330	2,857	920	491	702	1,095
45-49	2,968	1,252	3,088	3,018	1,273	647	1,359	1,262
50-54	5,285	1,791	3,312	4,110	1,509	1,030	1,406	1,398
55-59	5,484	2,211	3,727	5,540	1,888	1,169	1,886	1,512
60-64	4,296	3,458	5,911	8,065	1,898	1,704	2,922	1,307
65-69	7,057	4,547	6,371	6,260	2,164	2,312	4,060	3,168
70-74	5,044	6,659	7,956	7,898	7,121	3,006	5,702	4,134
75-79	5,948	7,148	12,594	4,783	4,410	3,929	6,095	2,662
80-84	3,652	12,186	12,082	39,394	5,028	6,331	7,895	9,524
85+	2,343	9,760	12,200	10,256	6,133	2,392	10,451	805

*Deaths per 100,000 population.

Age-specific Death Rates (Total Deaths)

While the age-adjusted rates used in the preceding section are meaningful and convenient summary statistics, they do not tell the entire story as shown by the age-specific rates of Table 3. Here we see that, for males at least, the benefits of marriage tend to fall off in late life with aged never married men experiencing lower rates than their ever married counterparts. After age 80, white widowers experienced higher rates than other white males.

The rates of Table 3 also allow age-for-age comparisons among the race-sex-marital groups. Again, the general trend is towards higher death rates for males and nonwhites than for females and whites, but marital status appears to make a difference in some instances, for example:

- Among white women, whose death rates are generally low, aged never marrieds, widows and divorcees as well as young divorcees experienced high mortality.

- Among nonwhite men, whose death rates are generally high, aged never marrieds, young widowers and the very young divorced experienced low mortality.
- Among white men, whose death rates are generally high, aged divorced men experienced low mortality.

Data comparable to those of Table 3 are available for all causes examined in this study; the interested reader may contact the Public Health Statistics Branch.

Discussion

The mortality patterns observed in this study suggest that marriage is a relatively healthy and safe institution while nonmarriage, particularly divorce and widowhood, appears to be a hazard to life. Of course, one may argue that unmarried persons are basic personality or health types who are more mortality-prone in the first place than their married counterparts, and this reasoning seems entirely appropriate in some cases. For example, high cirrhosis of the liver mortality among divorced persons could well reflect a problem that preceded and perhaps precipitated divorce, rather than vice-versa.

The above rationale notwithstanding, relationships between marital status and certain causes of mortality appear strong and would tend to indicate that divorce and widowhood are associated with circumstances that engender death by violent means as well as engender or aggravate disease processes. This is particularly true of divorced and widowed males, divorced white females and widowed nonwhite females. Never married nonwhite males also appear unduly prone to mortality, particularly lung cancer, cirrhosis and violent causes.

Regarding previously reported findings for cancer (1), present results for prostatic cancer appear consistent (nonwhites and married and widowed men exhibit higher rates), and present results for stomach, lung and cervical cancer mortality support previous findings of a higher frequency of stomach and lung cancer among males and a higher frequency of stomach and cervical cancer among nonwhites or lower socio-economic groups. However, present data do not support previous findings of a higher frequency of ovarian cancer among the nonmarried.

* * * * *

Definitions of Terms

Age-adjusted Death Rates: the 1973-75 average annual age-adjusted rates, computed by the direct method. Expressed as deaths per 100,000 population, these rates are those that would be expected if the average annual age composition of each race-sex-marital group were the same as the 1974 estimates for the State.

Age-race-sex-adjusted Death Rates: Shown on the front page, these average annual rates are those that would be expected if the average annual age, race, and sex composition of each marital status group were the same as the 1974 estimates for the State as a whole.

Chi-square Test of Significance: The test criterion is defined in any standard statistical text. In the present case, the "observed" values were the age-adjusted number of deaths determined by applying the 1973-75 average annual age-adjusted rates for persons 15 and older to the corresponding 1974 race-sex-marital population counts.



Sources of Data: Deaths are those occurring to N.C. residents aged 15 and older during the period 1973-75. Population bases were derived by applying to the 1974 age-race-sex-specific population counts, provided by the N.C. Office of State Planning, the proportions in each marital status group as determined by geometric extrapolations of the 1960 and 1970 Censuses (5).

Accuracy of the Rates: Due to recent changes in marital behavior, the rates of this report are subject to errors in population bases. Although it is believed that the geometric growth formula minimizes these errors, the reader is advised that in some instances the rates for married and widowed persons are probably understated while the rates for never married and divorced persons may be somewhat overstated.

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Public Health Statistics Branch
Division of Health Services
Department of Human Resources
P. O. Box 2091
Raleigh, North Carolina 27602